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ABSTRACT

Data on football injuries acquired from surveillance sources and in-depth investigations are presented. Results of the study are summarized by descriptions of the accident sequence, diagnosis of the injury, and specific equipment involved in the injury. (JD)

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HAZARD ANALYSIS

FOOTBALL: ACTIVITY and RELATED EQUIPMENT

JULY 1974

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U.S. CONSUMER PRODUCT SAFETY COMMISSION

HAZARD ANALYSIS

FOOTBALL: ACTIVITY AND RELATED EQUIPMENT

(1211)

December 1974

U.S. CONSUMER PRODUCT SAFETY COMMISSION
Bureau of Epidemiology

(NIIC 1211-74 H010)

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ABSTRACT

An estimated 300,000 football injuries are treated annually in hospital emergency rooms. This projection is based on reports through the NEISS of 14,280 injuries in calendar year 1973. The Forty-Second Annual Survey of Football Fatalities indicates that about 18 deaths a year are attributed to football accidents.

Sixty-one percent of the injuries were either contusions/abrasions, lacerations, or fractures. Thirty-one percent were strains/sprains. Concussions represented 1 percent. Two-thirds of the injuries involved the upper or lower limbs; almost one-sixth involved the head or neck. Ninety-eight percent of those reporting to the emergency room were treated and released.

Helmets, shoes, and padding have been recognized as problems by the athletic community. From the investigations of injuries occurring in organized football, it appears that even protective equipment is not completely effective. Another major problem was the interaction of the player's shoe with the football field which permitted excessive strain on the leg. Synthetic turf was mentioned in only one investigation. Next year, for the first time, high school and college football rules will recommend that helmets meet a specific standard. This will be mandatory in 1978. With regard to shoes, there is some momentum among teams toward the use of the safer soccer shoe which has shorter cleats.

I. INTRODUCTION

Football began evolving as a sport 150 years ago when William Webb Ellis picked up a loose ball and ran with it during a soccer match at the Rugby School in England. Sometime in the latter 19th century football became distinct from rugby until now it has totally eclipsed all other outdoor inflated ball games in the United States.

Concern with injuries in the game appears to be almost as old as the game itself. Rugby is played without protective equipment, but photographs of early football players show helmets and padded equipment. Today, protective equipment is provided for the head, shoulders, thighs, and lower trunk.

The U.S. Consumer Product Safety Commission (CPSC) estimates that 300,000 injuries associated with football are treated annually in hospital emergency rooms. Football is a rough contact sport and many injuries occur away from the home. Equipment serves an important protective function, although in some cases may actually contribute to injuries. Today, the completely outfitted player will wear a helmet, face mask, chin strap, mouth guard, neck collar, shoulder pads, hip pads, thigh pads, knee pads, elbow pads, football shoes, pants, and jersey, each item with one or more protective functions, and his ankles may be taped for support. With this equipment, the best studies to date show about five injuries per game. The seasonal rate in high school is about .5 per player season. Many of these injuries occur in practice.

The Forty-Second Annual Survey of Football Fatalities shows a mean of 18.9 which represents the number of annual fatalities directly attributed to football; the median is 18. "DIRECT - Those deaths which resulted directly from participation in football. INDIRECT - The indirect football fatalities are those which are cuased by systemic failure as a result of exertion while participating in football activity or by a complication which was secondary to a non-fatal injury." On the CPSC's Product Hazard Index, "Football, activity and related equipment and apparel," is ranked seventh.

The difference in levels of participation are possibly as great in football as they are in any recreation in the United States. At one extreme are the pre-school children making their first attempts to hold on to the ball. The other end of the scale is the college player who is a first round draft choice.

II. METHODOLOGY

Surveillance Data

The following analysis is based on injury data from the National Electronic Injury Surveillance System (NEISS) and on in-depth studies of football-related injuries.

The NEISS, which is operated by the Consumer Product Safety Commission's (CPSC) Bureau of Epidemiology, has been fully operational since July 1, 1972. Designed to develop statistically valid, nationally representative product-related injury data, the NEISS is a computer-based network of 119 statistically selected hospital emergency rooms located throughout the country. Through the application of estimator equations, projections of injuries treated in all U.S. emergency rooms can be made from populations receiving NEISS-reported emergency room treatment.

Surveillance injury data are transmitted daily to a central computer at Commission headquarters via teletype terminals in the hospitals. Each injury report indicates the type of product involved and provides information pertaining to the victim and the injury--age, sex, injury diagnosis, body part involved, accident location, and patient disposition. Based on the injury diagnosis, body part involved, and disposition, a severity rating is assigned to each case.

Since July 1, 1971, the NEISS has received surveillance reports of almost 45,000 football-associated injuries treated in hospital emergency rooms. Of these, 14,280 have been reported in the period January 1, 1973 through December 31, 1973.

In-Depth Investigations

An in-depth investigation is essentially a personal interview with the victim and/or his family or witnesses. During the investigation, the investigator records demographic data and obtains a detailed description of the accident, and, when possible, a sample of the product or products involved.

Cases are selected for investigation largely on the basis of the frequency and severity of NEISS reported injuries associated with the product involved, and the age of the victim.

Presently, in-depth investigations are conducted by CPSC headquarters and field staff and by private contractors. From 1970 until May 1973, when the Commission became operational, investigations were conducted by the Food and Drug Administration's Bureau of Product Safety, predecessor of CPSC. Other investigations utilized by the Commission were conducted prior to 1970 by the former National Commission on Product Safety and by injury study units operating under the U.S. Public Health Service, Detailed information has been provided by in-depth investigations of football injuries conducted in 1972 and 1973. A summarization of the 112 investigations can be found in Appendix A. All in-depth investigation reports are on file at the National Injury Information Clearinghouse of the Commission and are available to the public.

Death Certificates

The procurement of death certificates is directed through the Mortality Branch, Division of Injury Surveillance, within the Bureau of Epidemiology of the U.S. Consumer Product Safety Commission. The Commission is pursuing contracts with all 50 states in the United States, Washington, D.C., the Virgin Islands, and Puerto Rico. At this time, 21 jurisdictions, including New York City as well as New York State, have agreed to supply relevant death certificates (consumer product-related deaths) at a fee for each certificate. The contracts specify that each state or jurisdiction furnish death certificates on a month-to-month basis as well as providing those dating back to July 1, 1973. It is anticipated that more comprehensive information from this system will be available by the end of 1974.

One death certificate has been submitted indicating football injuries as the cause of death. Two other deaths reported from different sources were also investigated and are listed in the Appendix.

III. RESULTS

Surveillance Data

During the Calendar Year 1973, 14,280 accidents associated with football activity and related activities were reported through the NEISS. Using estimator equations, it was projected that this type of injury affected more than 300,000 persons in the last year.

Table 1 indicates the age distribution reported through the NEISS of those injured by football to range from under 2 years old to over 65. The majority of victims are between 10 and 25 years of age. Thirty-six percent (5,146) were from 10 to 14 years old; 40 percent (5,737) were from 15 to 19 years old; and 11 percent (1,593) were from 20 to 24 years old.

The location of the football activities is also shown in Table 1. In one-third of the injuries, the locations reported were non-specific. In the remaining cases, schools and other public facilities were two and one-half times as likely to be the injury environment as was the home.

A bar graph was used to depict the relative frequency of the injury diagnosis. The two major classifications were strains/sprains and contusions/abrasions - each accounting for about 30 percent of the injuries. Fractures followed with 22 percent and lacerations were next with 10 percent of the injuries. The last bar representing only 7 percent of the injuries includes a diagnosis which can be quite serious - concussion 1 percent. While this is a small proportion of the accidents

TABLE 1

INJURIES ASSOCIATED WITH FOOTBALL BY AGE AND ACCIDENT LOCATION AS REPORTED THROUGH THE NEISS

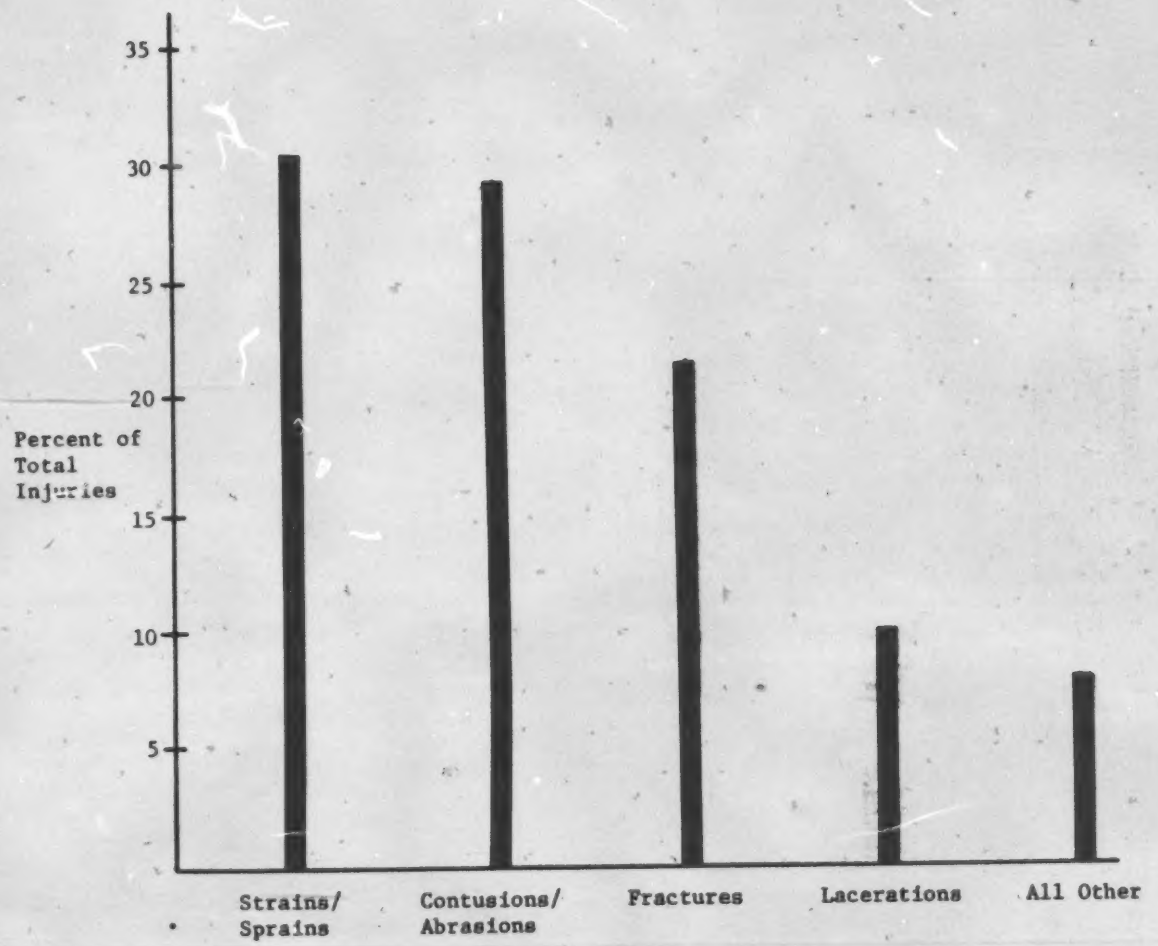
January 1, 1973 - December 31, 1973

N = 14,280

Age	Total	Other Public [1]	Home	Street	Unspecified
Unknown	1	1	-	-	-
0-2	6	2	3	-	1
2-4	33	3	14	1	15
5-9	701	178	238	12	273
10-14	5146	2265	1025	72	1784
15-19	5737	3069	619	67	1982
20-24	1593	721	193	32	647
25-34	844	339	119	20	366
35-44	160	55	44	4	57
45-54	40	11	15	1	13
55-64	13	3	4	-	6
65+++	6	2	2	1	1
Total Type	14,280	6,649	2,276	210	5,145

[1] Includes schools, public recreation facilities and institutions

FIGURE 1. FOOTBALL INJURIES BY DIAGNOSIS
AS PERCENT OF TOTAL REPORTED THROUGH THE NEISS
January 1, 1973 - December 31, 1973
N = 14,280



Source: Consumer Product Safety Commission/Bureau of Epidemiology

reported, when considered in relation to the 300,000 individuals treated in emergency rooms yearly, it represents 3,000 people.

The specific part of the body affected by each type of injury is shown in Table 2. Summarizing the information in this table, Figure 2 presents a bar graph of the body parts affected by the football injuries.

Two-thirds of the injuries involved arms, legs, or their appendages: 36 percent - arm, hand, or fingers; 32 percent - leg, foot, or toe. The lower leg was hurt most frequently (Table 2); the fingers and then the lower arm ranked second and third, respectively. About 19 percent of the diagnoses involved the trunk, usually the upper trunk. Trauma to the head or facial area occurred in 15 percent of the accidents.

After treatment in the emergency room of the reporting hospital, 98 percent (13,953) of the injured were released. The other 327 individuals were hospitalized or transferred to another hospital. During the reporting period, no deaths were reported through the NEISS in association with football.

TABLE 2
NUMBER AND PERCENT OF INJURIES REPORTED THROUGH NEISS BY DIAGNOSIS AND PART OF BODY INJURED
N=14,280

	TOTAL	ARM				LEG				TRUNK		HEAD & FACE						OTHER
		UPPER	LOWER	HAND	FINGER	UPPER	LOWER	FOOT	TOE	UPPER	LOWER	HEAD	FACE	EYE	EAR	MOUTH	NECK	
TOTAL	14,280 100%	121 1%	1846 13%	735 5%	2371 17%	174 1%	3462 24%	675 5%	224 1%	2141 15%	431 3%	532 4%	1034 7%	79 1%	28 *%	252 2%	163 1%	2 *%
LACERATION	1469 10%	8 *%	88 1%	80 1%	71 1%	16 *%	194 1%	44 *%	17 *%	17 *%	9 *%	137 1%	538 4%	14 *%	19 *%	217 2%	- -%	- -%
CONTUSION/ ABRASION	4193 29%	33 *%	500 3%	286 2%	482 3%	67 *%	820 6%	226 2%	65 *%	923 6%	231 2%	200 1%	277 2%	46 *%	6 *%	15 *%	43 *%	3 -%
FRACTURE	3164 22%	47 *%	651 5%	168 1%	891 6%	22 *%	424 3%	101 1%	88 1%	534 4%	20 *%	6 *%	199 1%	- -%	- -%	4 *%	9 *%	- -%
DISLOCATION	422 3%	5 *%	56 *%	6 *%	150 1%	- -%	39 *%	2 *%	6 *%	150 1%	1 -%	- -%	2 *%	- -%	- -%	4 *%	1 -%	- -%
STRAIN/ SPRAIN	4404 31%	21 *%	504 4%	164 1%	752 5%	33 *%	1889 13%	280 2%	42 *%	473 3%	138 1%	- -%	- -%	- -%	- -%	- -%	106 1%	2 *%
HEMATOMA	143 1%	4 *%	24 *%	9 *%	16 *%	29 *%	30 *%	2 *%	3 *%	8 *%	3 *%	11 *%	11 *%	8 *%	- -%	3 *%	2 *%	- -%
CONCUSSION	167 1%	- -%	- -%	- -%	- -%	- -%	- -%	- -%	- -%	- -%	- -%	167 1%	- -%	- -%	- -%	- -%	- -%	- -%
OTHER	298 2%	3 *%	23 *%	22 *%	39 *%	7 *%	66 *%	20 *%	3 *%	36 *%	29 *%	11 *%	7 *%	11 *%	3 *%	9 *%	2 *%	7 *%

*% < 1%

15 SOURCE: U. S. CONSUMER PRODUCT SAFETY COMMISSION
Bureau of Epidemiology

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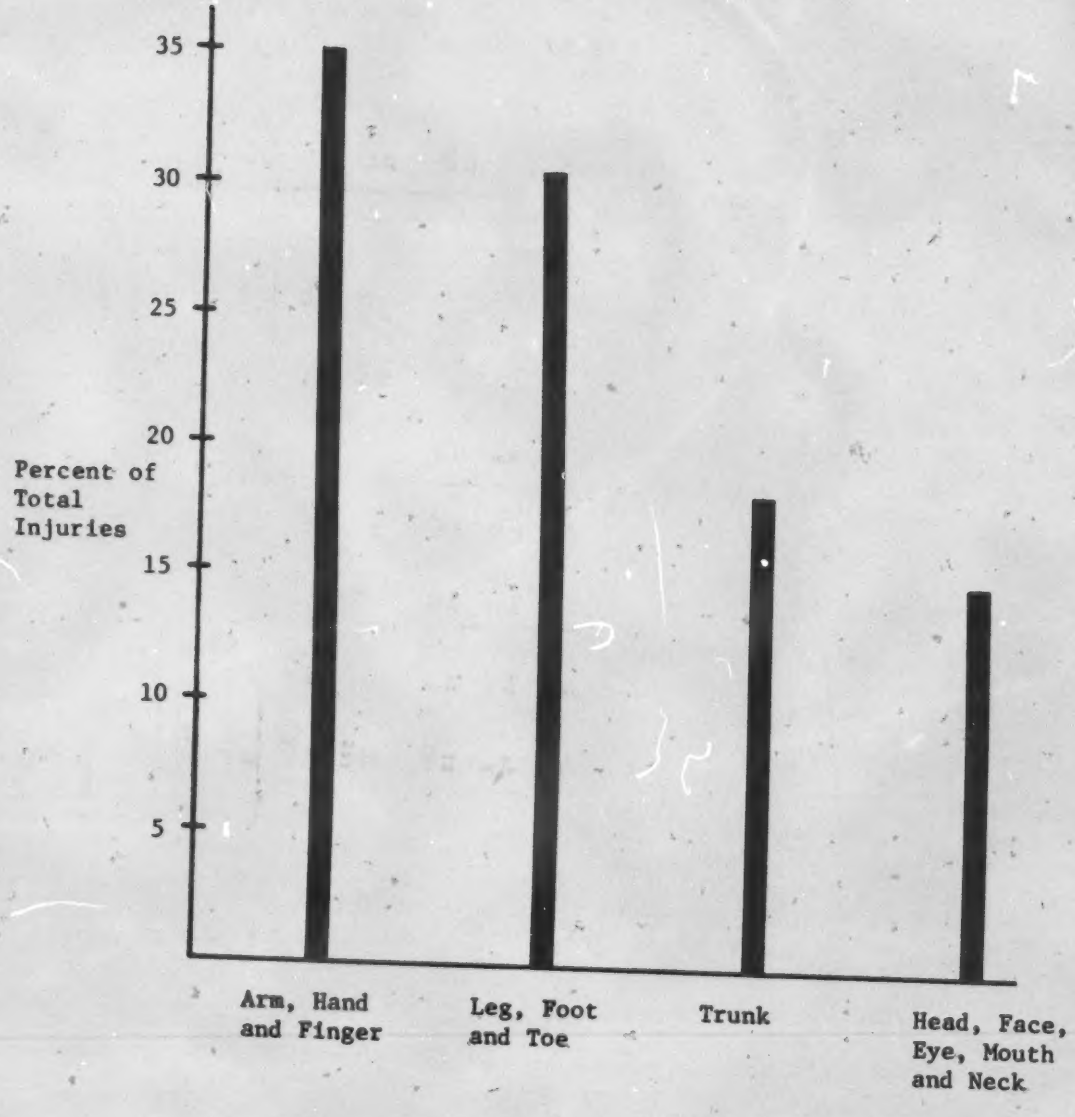
FIGURE 2. FOOTBALL INJURIES BY BODY PART AFFECTED AS PERCENT OF TOTAL REPORTED THROUGH THE NEISS
January 1, 1973 - December 31, 1973
N = 14,280



Source: Consumer Product Safety Commission/Bureau of Epidemiology

In-Depth Investigations

The in-depth investigations indicate who was involved, the nature of the associated products and, in a general way, what happened. They are not a random sample of the cases reported through the surveillance system but focuses on the more severe injuries, It would be incorrect to attempt to project ratios from the in-depth investigations to the general population.

The 112 in-depth investigations summarized in the Appendix were first classified as Organized and Unorganized Football. Playing football in the park would be considered Unorganized Football. Organized football involved games or regular practice that seemed to be scheduled and have some responsible supervision.

The number of injuries occurring during these organized events might be decreased by changes in rules or equipment. Within Organized Football, there were instances of protective equipment being ineffective, missing or misused as well as examples of unsafe field conditions.

"Protective Equipment Not Effective" applied to those cases in which there was injury beneath the protective padded covering. Most occurred after player contact or tackling. Players suffered concussions even though football helmets were worn. Contact with the opponent's knee was mentioned in three of the accident reports. Other times, players piled on two of the victims.

One 20 year-old boy died the day after he was injured attempting a tackle. The player wore a football helmet and face guard; a "collar" was not worn. The game film shows the ball carrier ducking beneath the victim.

"In the film it appeared as if the victim's face guard had caught the back of the ball carrier's jersey. The ball carrier then straightened up, appearing to strike the victim's face guard. Both players then fell backwards and again the victim's head appeared to strike the ground." (See Case No. A11802 "Summarization of In-Depth Investigations" in Appendix)

A 21 year-old boy cracked the third cervical vertebra (neck) after being hit from the side, possibly in the head. A football helmet was worn, but not a protective collar.

The cases assigned to "Missing or Misused Protective Equipment" were those in which the injury might have been prevented or reduced by wearing such equipment; in one case, knee pads were not held in place. Some of the circumstances described were:

- Fracture of collar bone - Shoulder pads not worn
- Laceration of eye - Helmet not used
- Fracture of nose - Helmet not used
- Hematoma of upper leg at knee - Knee pads not held in place

The "Field and Shoe" cases involve injury to the knee, leg or ankle in which the shoe-turf interaction appears to have contributed to the injury. Fracture of the foot and torn ligament in lower leg were the diagnoses of two injuries in which the player's cleats stuck in the field. In one case, the field was dry and, in the other, wet from a rain the previous night. A field with high grass was the site of another leg injury--a fracture to the lower leg.

In some of the organized games, the behavior of the player seems to have been significant. Poor technique in blocking, tackling or receiving the ball was alluded to in the reports of various fractures, lacerations and sprains.

In some reports, there were multiple factors and selecting the most important one long after the event is not possible. For example, in one case where the diagnosis was "Concussion, Head; Heat Exhaustion, All Parts of Body," a more effective helmet might have prevented the concussion, but playing without a helmet might have prevented the heat exhaustion. A second example is the player who died from a ruptured spleen. One immediately looks for a prior illness and/or a particularly severe blow. No evidence of either could be found.

In unorganized football games, the condition of the playing field appeared to be a factor in many of the accidents. Rocks, glass and curbs were the causes of many injuries--either by tripping the player or causing a laceration or bruise after a fall during the game. Many of the reports indicated no protective equipment was worn by the players. The injuries described in the 61 reports of unorganized games included concussions, fractures, sprains, and other diagnoses.

One may be inclined to assume that those injuries occurring at schools and other public places represent the contribution of organized football to the injury data. While the surveillance data do not provide the information necessary to distinguish between organized and unorganized football, the in-depth investigations indicate that many informal games take place on public property.

From the data, it appears that a number of factors contribute to

the sum of football injuries. There are a variety of injuries found in football and a multitude of associated circumstances. In organized football, better standards for equipment and field condition might reduce the risk of injury. However, the injuries occurring in unorganized football do not take place within a structure of standards and rules and accordingly may be less amenable to reduction.

Death Certificate

A head injury while playing football was indicated as the underlying cause of death in one death certificate. A 15-year-old boy died two days after the accident. The immediate cause of death given was a subdural hematoma.

IV. DISCUSSION

Many of the product-associated injuries reported to the U.S. Consumer Product Safety Commission involve an accident in which an unplanned hazardous event causes the injury. Frequently, one can seek to prevent the potentially hazardous event, thereby preventing the injury. In football, we must reduce the risk of injury but permit a potentially hazardous activity to occur.

Dr. Carl S. Blyth at the University of North Carolina reports that the overall rate of injury of football players is slightly less than .5 per player season. Dr. James G. Garrick at the University of Washington in Seattle has reported an injury rate of .86 per player season. Probably the main difference is in the reporting mechanism. In Seattle, there are full-time professionally trained observers in the schools while in North Carolina, data were reported weekly by the coaches.

Dr. Blyth indicates that the most serious threat to life and the quality of life is re-injury. Fatal head injuries are frequently associated with prior concussions. An informal survey of high school football in northern Virginia disclosed that two concussions take a player out of football for the season. In the State of of Washington three concussions are sufficient to take a player out of football for the season. Unfortunately, there are no uniform criteria for limiting the participation of players who have had a concussion. Fortunately, in football one does not normally find the comminuted fractures sometimes seen in skiing and frequently found in

automobile accidents. The fractures described in the detailed investigations found in the Appendix seem to have been easily treated. Sprains present another problem. They are sometimes more serious than fractures. There is a propensity with sprains for re-injury with successively less complete recoveries. Activity may be restricted for the rest of the player's life. If re-injury is a problem, are other host variables involved?

The United States Army seems to think there is a possible connection. Currently they are conducting a study at the U.S. Military Academy Hospital at West Point, New York. New cadets are examined to determine the range of motion in their joints. This initial evaluation will be compared with others following athletic injury. Dr. Thorndike is inclined to consider host factors, at least for concussions, and states, "At least we may state that the absence of an organic lesion in the cerebrum of an athlete does not convince us that he does not have a hyper-sensitive cortex." He cites the Kaplan Browder study of encephalograms from boxers.

Where products were involved in injury, it appears they were ineffective rather than defective. This points to the need for a better understanding of human tolerance. Only in the area of footwear where exposure to a variety of surfaces is available to evaluate products, do injury rates indicate a way to directly reduce football injuries.

For the North Carolina study, the practice and playing fields of 9 randomly selected schools were resurfaced. These natural turf fields were maintained in good condition during the study period. The players in three

of these schools were supplied with soccer shoes, which have a short cleat integral with the sole. The other 6 used the conventional football shoe. The schools where the players wore soccer shoes and used the resurfaced fields had a knee and ankle injury rate per player season of .115, with the resurfaced fields and regular cleats that rate was .148, and for the schools where no change was made that rate was .213. The results of this study suggest that shorter cleats would lower the incidence of knee and ankle injuries. This conclusion was also reached by Joseph Torg in his study of the effect of football cleats and knee injuries.

Synthetic turf is involved in only one case in our data. Most of our cases are high school or unorganized games and these seldom occur on synthetic turf. Outside of the Commission there have been separate studies of high school players and of professional players, though a direct comparison may not be suitable because of the differences in the populations studied and the conditions under which they participated. Looking at these data may help in appreciating the factors. The discussion of artificial turf as a factor in injury has concentrated on abrasions caused by sliding across the individual blades, and on knee and ankle injuries which would be associated with the characteristics of the loads transmitted from the surface through the shoe and into the lower leg.

A three year study of injuries in the National Football League (NFL) found 2.7 injuries per game on synthetic turf versus 2.0 on natural turf. Using injuries involving two or more missed games as an index, the NFL study found the difference in injury rates was not significant.

Dr. Garrick at the University of Washington found in a study of 228 high school football games, 80 of which were played on one of the first synthetic fields, that the injury rate on this field was .76 per game versus .52 injuries per game on natural turf. Dr. Garrick also compared injury rates on wet and dry fields and found injury rates per game: dry synthetic, .93; wet synthetic, .61; dry natural, .53; and wet natural, .50.

In studies at both the University of North Carolina and the University of Washington, the incidence of leg injuries differed by a factor of 2 for various combinations of shoe and playing surfaces. Risk of leg injury appeared to be associated with conditions in which excessive loads are transmitted to the knee and ankle. One or more optimum combinations of surface and shoe might limit the loads entering the shoe, and thus reduce the risk of injury.

The unorganized activity is particularly agonizing because there is little one can do other than caution about suitable play areas and protective equipment. Channeling interests into other sports would reduce some of the football problems but the overall effect is unknown.

The major topics of research in football protective equipment have been the helmet and the shoe. Sixty percent of direct fatalities listed in the Annual Survey were the result of head injury. A performance standard for football helmets was adopted by the National Collegiate Athletic Association and the National Federation of State High School Athletic Associations as a recommended practice to be in effect in 1975. In 1978, this will become part of the rules. This will have the effect of making it a national voluntary standard since all football other than professional is played to these rules. This is the only protective equipment covered by standards.

Fortunately, most of the football injuries were not a serious threat to life. No single act, short of prohibiting football, could have a dramatic effect in reducing the injury rate. However, the solution to a number of separate problems might have a significant impact in reducing the risk of permanent injury to young men in organized games at junior high schools, high schools, and colleges.

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SUMMARIZATION OF 112 IN-DEPTH INVESTIGATIONS OF PRODUCT RELATED INJURIES:

FOOTBALL, ACTIVITY AND RELATED EQUIPMENT (1211)

May 1974

U. S. CONSUMER PRODUCT SAFETY COMMISSION
Bureau of Epidemiology

CASE NO.	DATE	AGE	SEX	ACCIDENT SEQUENCE: PRECIPITATING EVENT/ACTIVITY	ACCIDENT SEQUENCE: DESCRIPTION	RESULT (DIAGNOSIS)	DISPOSITION	PRODUCT MAKE COMPOSITION
PATTERN: Organized Football (Protective Equipment not Effective)								
A22105*	10/5/73	15	M	Hit in head	Victim was tackled in a high school game. The coach said, when he fell, his chin hit the ground and the tackler's jaw bone hit the victim's temple.	Concussion, head	Treated & Released	Face guard
A06877*	3/7/73	13	M	Hit in head	Victim was practicing football at school when he was tackled and received a mild concussion.	Concussion, brain	T & R	Not Stated
A06851*	2/23/73	16	M	Hit in head	Victim was practicing football with his school team when he "received a blow to the head encountered from player contact."	Concussion, head	T & R	
A07055*	11/3/72	16	M	Hit in head	Victim and an opponent "collided head on." Victim continued to play, but on the bus going home, victim fainted. Equipment is not described.	Concussion, head	Treated & Admitted (1 Day)	Unknown
A11019*	10/25/72	14	M	Hit in head	Victim was playing competitive football when he was hit in the head by an opponent's knee.	Concussion, brain	T & R	Football Helmet (No model number)
A00204*	10/21/72	14	M	Hit in head	After victim was tackled in the game, five other boys piled on. He suffered no pain until the next evening when he had a severe headache.	Concussion, brain	T & R	Football helmet
A02417*	9/28/72	13	M	Hit in head	After he was tackled in a Jr. High game, victim's helmet was struck by another player's knee.	Concussion, head	T & R	Football Helmet
A07802*	9/7/72	14	M	Hit in head	Victim was playing in Jr. High School football game when the accident occurred. Victim was making a tackle when he came in contact with another player at full speed, hitting his head against the other player's knee. Players were wearing football equipment.	Concussion, brain	T & R	Football Helmet
A06843*	2/21/73	16	M	Elbow in face	After making a tackle during practice, other player's forearm struck victim's nose, breaking it. All of the players were practicing in full football protective equipment. Face mask had a single bar.	Fracture, nose	T & A (1 D)	Single bar face mask

CASE NO.	DATE	AGE	SEX	ACCIDENT SEQUENCE: PRECIPITATING EVENT/ACTIVITY	ACCIDENT SEQUENCE: DESCRIPTION	ACCIDENT SEQUENCE: RESULT (DIAGNOSIS)	DISPOSITION	PRODUCT MAKE COMPOSITION
PATTERN: Organized Football (Protective Equipment not Effective) (Cont.)								
A11802	11/18/72	20	M	Not defined	The game film shows the ball carrier ducking beneath the victim. "In the film it appeared as if the victim's face guard had caught the back of the ball carrier's jersey. The ball carrier then straightened up, appearing to strike the victim's face guard. Both players then fell backwards and again the victim's head appeared to strike the ground." A "collar" was not worn.	Herniation of brain stem Right subdural hemorrhage, temporal lobe Right epidural hemorrhage, occipital lobe	Expired after 1st day	Football Helmet - Face Guard
A00423*	10/28/72	21	M	Not defined	Films were made. Victim was hit from the side, possibly in the head. He was not wearing a protective collar. Nature of protection needed is unknown.	Cracked 3rd cervical vertebra, neck	T & A (5 D)	Football Helmet
A00201*	10/11/72	10	M	Hit in head	Victim was tackled in League practice. "After the play was over, several other players piled on."	Concussion, head	T & R	Football Helmet (D)
A03430	9/24/72	17	M	Hit in knee	Victim was injured when a player on the other team tackled him, striking him on the knee with his helmet. Victim continued to play until he was tackled again in the same manner.	Bruise, right knee	T & R	Football helmet and knee pad
A06213*	9/11/72	17	M	Tackling	Victim was practicing a one-on-one tackle and was the pursuer. The accident occurred while the victim was making the tackle.	Shoulder separation, left shoulder	T & R	Shoulder pad
A01271	8/20/73	16	M	Tackling	This was the first day of contact during preseason practice. During one-on-one tackling the victim was struck by the head and shoulders of the other player, on helmet and upper trunk. He was lifted up and back falling on his buttocks. He suffered a mild concussion in October 1972.	Subdural hematoma	Hosp. (28 D) Expired	Helmet
PATTERN: Organized Football (Missing or Misused Protective Equipment)								
A20041*	10/1/73	16	M	Shoulder pads not worn	Victim was playing football in his school gym during a scheduled physical education period. He was carrying the ball when two boys ran into him. One hit him in the chest and one hit him in the back. No football equipment was worn.	Fracture, collar bone	T & R	-

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PATTERN: Organized Football (Missing or Misused Protective Equipment) (Cont.)								
A06875*	3/12/73	15	M	Helmet not used	Victim was holding dummy when a player tackled the dummy. The coach said he could not tell what caused the cut. Victim was not wearing a helmet at the time of the accident because his helmet was being fixed.	Laceration, right eye	T & R	None
A07946*	2/28/73	16	M	Helmet not used	Injury to victim occurred during his P. E. class. Protective equipment was not worn.	Laceration, eyebrow	T & R	N. S.
A07018*	9/13/72	12	M	Helmet not used	Victim was struck on the nose by a football in P.E. class.	Fracture, left side of nose	T & A (2 D)	Football
A02041*	9/11/72	11	M	Knee pads not held in place	While tackling the quarterback, victim was hit by the fullback whose helmet or shoulder pads contacted the inside of his thigh. The victim's knee pad was not held in place by an elastic strap and it slid to the outside beneath his sweat pants.	Hematoma, upper leg	T & R	
A15195	10/16/73	16	M	Rib pads not worn	Accident occurred in practice. Victim did not carry through with a proper block because the other boy was apparently hit in the groin. The second player's momentum carried forward into the victim.	Fracture, rib	T & R	N.S.
PATTERN: Organized Football (Field and Shoe)								
A06399	10/6/73	22	M	Fell on	Victim fell making an interception and was fallen upon. The game was sponsored by the City Flag Football League.	Separated shoulder	T & A (5 D)	N. S.
A23030*	9/12/73	16	M	Cleats stuck in field	Victim was tackled during a junior high practice. His foot remained planted as he went down. The day was hot and dusty; the field was dry.	Fracture, foot	T & R	Shoe, short cleat
A17102	11/3/72	15	M	Cleats stuck in field	Victim was playing high school football on a grass field when, during one play, he swerved suddenly. As he swerved, he caught his cleats in the soft ground that was wet from the rain the night before.	Torn ligament, lower leg	T & A (6 D)	Football Shoes and Cleats
A11021*	10/29/72	15y	M	Attempting tackle	Victim, playing football, attempted to tackle another player. He turned and twisted his knee. Shoe is not described.	Dislocation, knee	T & A (7 D)	N. S.

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PATTERN: Organized Football (Field and Shoe) Cont'd.								
A03448	9/22/72	15	M	High grass	Victim was tackled around the waist. After the fall, he tried to stand but could not. "At the start of the game, victim's trainer looked over the field and noticed that the grass was high and warned his team to be careful because 'there will probably be some twisted knees and ankles.'"	Fracture, lower left leg	T & R	N. S.
PATTERN: Organized Football (Fall)								
A06835*	2/20/73	15	M	Breaking fall	Victim was injured in practice as he blocked another boy. He bumped him with his right shoulder and then he bounced back to the ground. He attempted to catch himself with his left arm.	Double fracture, left lower arm	T & A (2 D)	-
A07001*	9/5/72	16	M	Threw a bad block	Victim was tackling dummy and forgot to roll to his side. He landed on his elbow, causing the injury.	Sprain, right arm and shoulder	T & R	Football practice tackle dummy
PATTERN: Organized Football (Other Player's Shoe)								
A03604	11/12/72	20	M	Kicked	Victim was playing rough football in an organized league when he slipped and fell in the muddy grass. The receiver was still in motion and accidentally kicked the victim in the mouth with the sole of his cleated shoe.	Laceration, upper lip	T & R	Football shoe
A03542	10/22/72	16	M	Stepped on	After completing a tackle, victim was stepped on by a second player.	Hematoma, hand	T & R	-
PATTERN: Organized Football (Not Determined)								
A23032*	9/1/73	19	M	Hit in head	Victim, a college freshman, hit an offensive blocker with his head during the first quarter. At half time, he had trouble staying awake. The weather was hot and humid. The starting time was moved from 1330 to 1630. Prior to college, he had 12 years of organized football experience. Injury history is "knocked unconscious a couple of times," "heat problem" in 9th and 10th grades. He "returned to full speed contact" in 2 days.	Concussion and heat	T & A	Helmet
A00825*	3/21/73	16	M	Hit in face	Victim was stiff-armed with a closed fist while playing touch football at school.	Fracture, face	T & A (6 D)	None

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CASE NO.	DATE	AGE	SEX	ACCIDENT SEQUENCE: PRECIPITATING EVENT/ACTIVITY	ACCIDENT SEQUENCE: DESCRIPTION	RESULT (DIAGNOSIS)	DISPOSITION	PRODUCT MAKE COMPOSITION
PATTERN: Organized Football (Not Determined) (Cont.)								
A40302*	9/8/72	10	M	Tackling	While attempting a tackle in a supervised event, victim was hit by the other player's helmet about 5 inches below the shoulder joint.	Strain, upper arm	T & R	Equipment Shoulder pad/helmet
A11681*	10/31/73	16	M	Piled on	"He said he had 'ran a play' and was in a pile-up of four boys when he very suddenly became aware of the pain in his wrist."	Fracture, wrist	T & R	N. S.
A06397*	10/9/73	17	M	Knocked down	Victim was knocked down in P. E. class after intercepting a pass.	Fracture, rib	T & R	N. S.
A22104*	10/3/73	16	M	Piled on	Victim was practicing with his school team when, after making a clean tackle, he ended up on the bottom of the pile. It is thought that the boy's arm was in an unnatural position when the boys piled on.	Dislocation, shoulder	T & R	Shoulder Pad
A23028*	8/28/73	20	M	Heat exhaustion	Victim was practicing with his college team and was involved in a full contact one-on-one tackling drill. He had suffered heat exhaustion in 1970 and 1972. Temperature was in high 90's, heat index 84.	Concussion, head; heat exhaustion, all parts of body.	T & A (1 D)	Football Helmet
A07601*	4/17/73	17	M	Ran into	Victim was practicing football with the school team when one of the players accidentally ran into him and jabbed him in the penis with his elbow.	Contusion, penis	T & R	-
A06916*	3/21/73	16	M	Tackled	Victim was practicing football with his high school team. He was carrying the ball up the middle when he was tackled by two defensive players. One player tackled his legs and one tackled his waist. His left wrist was hit by the defender's helmet.	Contusion/abrasion, left wrist	T & R	-
A06866*	3/6/73	16	M	Knocked down	Victim is a lineman for his high school football team, and during practice he was knocked down by a member of the opposing squad. Victim received several small cuts and bruises on his chest. Equipment is not described.	Abrasion, upper chest	T & R	-

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PATTERN: Organized Football (Not Determined) (Cont.)								
A06855*	2/26/73	16	M	Tackled	Victim was carrying the ball when he was tackled by several players in practice. Equipment not fully described.	Fracture, cervical vertebrae	T & R	-
A14783	11/4/72	17	M	Blocked	Victim was hit by a "brush block" in a "trap play." "...the execution of the block did not knock the latter off his feet, but a few moments later he was observed shuddering in a semi-kneeling position." The game film did not show any event in prior plays which may have caused his injury. Both the school principal and coach stated he "had been in good health throughout" the season.	Ruptured spleen	Dead on Arrival	Foam rubber pads over abdomen not named
A07830*	10/30/72	13	M	Tackled	Victim was carrying the ball in practice when he was tackled. His left arm and shoulder hit the ground with the full force of his and the tackler's weight.	Fracture, left collar bone	T & R	Football shoulder pads
A28311*	10/26/72	15	M	Piled on	Victim was playing "school football" when he ended up on the bottom of a pile-up. It is not known whether his head hit the ground hard of if he was hit by another player. Equipment is described by "none involved."	Concussion, brain	T & A (2 D)	None
A40168*	10/14/72	18	M	Struck in chest	Victim was playing high school football when he was struck in the chest by another player.	Fracture, sternum	T & R	-
A40303*	9/11/72	13	M	Hit on shoulder; other player's protective equipment	Victim was practicing with his football team and was tackled by another boy who struck him at a right angle in the collar bone with his helmeted head. Victim was wearing proper football equipment at the time of accident.	Fracture, left collar bone	Treated & Transferred	Equipment Shoulder pad/helmet
A07402*	9/6/72	14	M	Tackled	Victim was practicing football with his school team. They were performing four-on-one tackling and victim was being tackled. One of the tacklers fell on victim's wrist.	Dislocated left wrist	T & R	-
A40301*	8/24/72	14	M	Other player's protective equipment	"Victim tackled another player and other player's face mask and helmet hit victim's back."	Bruise, back	T & R	Helmet
A00820*	9/28/73	16	M	Hit by teammate	Victim ran into a teammate playing touch football in P. E. class.	Laceration, mouth	T & R	None

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PATTERN: Unorganized Football								
A11684*	11/11/73	16	M	Tripped on rock	No equipment used in this game. Victim tripped over a rock. Another player tripped and fell on him.	Torn meniscus, knee	T & R	-
A18757*	4/9/73	18	M	Struck rock	When tackled in game with friends, victim's face hit a rock on community playground. No protective equipment was used.	Laceration, right side of face	T & R	-
A18733*	3/11/73	15	M	Struck rock	Victim was playing football barefooted. He was running to kick ball when he hit a small rock. No protective equipment was used.	Fracture, right toe	T & R	-
A07934*	2/19/73	4	M	Fell on rock	Victim was playing football and wrestling with some other older boys. One boy pushed victim causing him to fall on a large rock.	Fracture, right wrist	T & A (1 D)	-
A06869*	3/3/73	10	M	Fell on glass	Victim and another player jumped up to catch a passed football. Victim missed pass; other boy did not. Boy and victim ran into each other at the edge of the higher level grounds, causing victim to fall to bottom of hill onto a glass pointed edge of a broken car windshield.	Laceration, left buttock	T & R	-
A13949	1/1/73	27	M	Fell on glass	Victim was running to catch football and did not see debris on the ground. The debris caused him to fall backward and cut his hand on glass that was in the dirt.	Broken finger, left hand; laceration, left hand	T & R	-
A03629	11/29/72	12	M	Fell on glass	Victim was carrying ball when his brother tackled him. Victim fell on piece of glass. Six children were on the two teams.	Laceration, left knee	T & R	-
A03491	9/23/72	24	M	Fell on glass	Football game was in a parking lot. Victim fell on a piece of broken glass.	Laceration, forearm	T & R	-
A00509*	3/5/73	11	M	Kicked	Victim was playing touch football in schoolyard. Victim was chasing boy with ball and, when he reached out to tag him, his hand hit boy's foot. Victim then fell on his hand, but accident was caused by contact with other boy's foot. No protective equipment was used.	Strain/sprain, finger	T & R	-
A13706	12/24/72	15	M	Breaking fall	While carrying football, victim was tackled. He held football in his right hand and fell on his left hand. This was an informal game.	Sprain, left hand	T & R	-

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PATTERN: Unorganized Football (Cont.)								
A06896*	3/13/73	11	F	Stepped on	Victim was standing by edge of her front yard watching some boys play football. One boy caught a pass and began running. He accidentally stepped on victim's right foot. The boy was wearing either football or baseball cleats.	Laceration, right toe	T & R	-
A06632*	4/23/73	12	M	Stepped on	Victim, his brother and father were playing football in their back yard. The brother accidentally stepped on victim's foot. Victim was not wearing shoes. No protective equipment was used.	Bruise, left big toe	T & R	-
A01413*	4/19/73	5	F	Hit with helmet	Victim was playing in yard with other children her age when an altercation occurred between her and a little boy. Boy was wearing football helmet and took it off and hit victim with it.	Hematoma, neck	T & R	-
A07616*	4/19/73	18	M	Hit curb	Victim and friends were playing sandlot football when victim was tackled. He fell on edge of sidewalk curb and cut his knee.	Laceration, left knee	T & R	-
A11816*	3/10/73	13	M	Slipped in street	Victim was playing two handed touch football in street in front of his home. He was carrying ball, running a slant pattern. Suddenly, he cut his direction while running at full speed. At this point, he ran into a patch of grease and lost his footing. He tried to recover, but twisted his ankle doing so. No protective equipment was used.	Sprain, left ankle	T & R	-
A13971	12/20/72	9	M	Missed catch	Victim and friends were playing with football and victim missed a catch.	Bruise, right 4th finger	T & R	-
A17206*	11/6/72	11	M	Broke eyeglasses	Victim was playing sandlot football when he fell, striking his face and breaking his eyeglass frames.	Laceration, forehead	T & R	-
A11022*	10/28/72	13	M	Hit house	Victim and friends were playing football in victim's back yard. Victim was running with football when attempted tackle was made. He was pushed into the corner of the house.	Fracture, 5 ribs	T & A (1 D)	-
A03438	10/19/72	13	M	Stepped on curb	Victim was going out for a long pass in the end zone. There was a 3-inch sidewalk curb at end of the end zone. As victim stepped up on curb, he applied force on the back of his foot, spraining it.	Sprain, right ankle	T & R	-

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PATTERN: Unorganized Football (Cont.)								
A05686*	9/24/73	19	M	Tackled	Rather than tackling the carrier with his shoulder, victim grabbed his legs in a sandlot game.	Strain, shoulder	T & R	-
A07615*	4/19/73	19	M	Fell	Victim was playing football in the street. He jumped to catch a pass and fell.	Fracture, lower portion of left hand	T & R	-
A06633*	4/19/73	26	M	Tackled	Victim and his brother were playing football. Victim was carrying the ball when his brother tackled him. As victim fell, he struck his mouth on his brother's knee. No protective equipment was being used.	Laceration, mouth	T & R	-
A06596*	4/18/73	15	M	Tackling	Victim was injured making a tackle in an unsupervised sandlot game.	Fracture, clavicle	T & R	-
A05697*	4/18/73	17	M	Kicked in mouth	Victim was playing unorganized football with about ten other boys when he was knocked down and accidentally kicked in the mouth by a boy wearing spiked shoes. Victim was not wearing any protective equipment.	Laceration, mouth	T & R	Football shoe
A07607*	4/11/73	16	M	Tripped	An opponent tripped and fell on victim during an evening game in the park.	Fracture, left lower leg	T & R	-
A06956*	4/1/73	10	M	Tackled	Victim was playing football with some friends in front of his home. He was struck head-on by another player in an effort to stop him. No protective equipment was being used.	Fracture, lower left leg	T & R	-
A06915*	3/21/73	14	M	Tackled	Victim was playing a game of touch football when he was tackled. Victim fell into a pile of other boys and this knocked the wind out of him. No protective gear was used.	Contusion/abrasion, chest	T & R	-
A06874*	3/12/73	10	M	Fell	Victim was playing sandlot football on the school lawn. He was running with the ball when he fell, turning his right foot. No protective equipment was used.	Fracture, right foot	T & R	-
A06879*	3/7/73	7	M	Collided with other player	Victim and some friends were playing sandlot football in a neighbor's yard. Victim was running for a pass when he collided with another boy. Victim's lower lip was struck by other boy's head.	Laceration, lip	T & R	-

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PATTERN: Unorganized Football (Cont.)								
A06872*	3/6/73	8	M	Tackled	Victim was playing football in his front yard. He was tackled by one of the other boys and fell unnaturally on his collar bone. No protective equipment was worn.	Fracture, collar bone	T & R	-
A04662*	2/28/73	10	M	Tackled	Victim was tackled and sprained his ankle playing in the schoolyard.	Sprained ankle, right leg	T & R	-
A02515*	2/24/73	14	M	Knocked down	Victim was knocked down by opponent who fell on victim. Game was played in the church yard.	Fracture, left wrist	T & R	-
A07934*	2/19/73	4	M	Pushed	Victim was pushed while playing with a group of 9 and 10 year olds.	Fracture, wrist	T & R	-
A07929*	2/18/73	29	M	Fell on	Victim was running down the football field and, as he reached down to pick up the ball, another player fell on him. No protective equipment was used in this touch football game.	Simple fracture, left collar bone	T & R	-
A07925*	2/11/73	18	M	Making sharp turn	Victim was running completely free of other players when he tried to make a sharp turn on the basketball shoes.	Torn ligament, left knee; laceration, left knee	T & A (15 D)	canvas basketball shoes
A06805*	2/6/73	9	M	Tackled	Victim was tackled and fell, striking his nose against another player's knee. None of the boys wore protective gear in this game with friends.	Fracture, nose	T & A (2 D)	-
A01057*	2/6/73	14	M	Kicked in head	Victim was trying to tackle an offensive player carrying the ball. As victim made the tackle, he was kicked in the head with the offensive player's right knee. Victim was unconscious for 4 to 5 hours. None of the players wore protective gear.	Concussion, right side of head	T & A (4 D)	-
A00447*	1/21/73	16	M	Tackled	Victim was carrying the football when he was tackled by two of his friends. Victim fell, hitting his head on the ground and leaving him unconscious for an undetermined length of time. Neither victim nor any of the players wore protective gear.	Concussion, brain	T & A (4 D)	-

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PATTERN: Unorganized Football (Cont.)								
A13993	12/20/72	15	M	Elbowed in mouth	Victim was playing football when he was elbowed in the mouth by one of his teammates. Neither victim nor any of the others wore protective gear.	Laceration, upper lip	T & R	-
A13994	12/17/72	20	M	Collided with other player	Victim was playing touch football when he and another player collided, head to victim's chin.	Laceration, chin	T & R	-
A13945	12/2/72	15	F	Tackled	Victim caught the football and was tackled from behind. The victim, upon being tackled, lost her footing as she spun around with the tackler. Victim's left leg went out from under her as she fell backwards onto her right side and her left knee struck the ground. Accident occurred at friend's home.	Torn ligaments and torn cartilage	T & A (7 D)	-
A13929	12/2/72	20	M	Tackled	Victim was tackled as he carried the football. As he was tackled, he lost his footing and flipped over forward.	Torn muscle, right shoulder	T & R	-
A03635	11/26/72	19	M	Tackled	Victim was carrying the ball in an informal game when he was tackled by three boys. He fell and landed on his knee and another boy fell on top of his knee after making the tackle.	Pulled muscle, left knee	T & R	-
A03644	11/19/72	8	F	Tripped	Victim was playing football with her next door neighbor. He passed the victim the ball and, as she ran back to catch it, she tripped and fell.	Fracture, right ankle	T & R	-
A03570	11/13/72	24	M	Tackled	A "good, rough" game with friends. The other team averaged 20 lbs. heavier. Victim wore sneakers but no football equipment. Injury occurred when tackled.	Sprain, leg	T & R	-
A03620	11/12/72	28	M	Tackled	Ball carrier was tackled and forced into another man's knees while playing in the park.	Fracture, 6th rib	T & R	-
A11021*	10/29/72	15	M	Attempting tackle	"Subject playing football and attempting to tackle another player, subject turned and twisted knee."	Dislocated knee	T & A (7 D)	-
A40305*	10/15/72	17	M	Knocked down	Victim was knocked down by another player as he carried the football. This was a sandlot game with friends.	Fracture, tibia	T & R	-

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PATTERN: Unorganized Football (Cont.)								
A07034*	10/15/72	16	M	Kneed in ear	Victim was playing touch football with some friends. He started to block his opponent and opponent's knee came up and hit victim in the ear.	Puncture, ear drum	T & R	-
A03488	10/15/72	16	M	Attempting tackle	Victim was playing touch football with some of his friends and took a dare from a larger boy to tackle him. He was injured making this tackle.	Fracture, clavicle	T & R	-
A40167*	10/6/72	14	M	Collision	Victim was playing football on his school playground when he came in contact with another boy and bent his finger back.	Fracture, finger	T & R	-
A28310*	10/6/72	14	M	Tackled	Victim was playing football on the school playground when he was tackled by another boy and he fell on his arm.	Fracture, lower arm	T & R	-
A02416*	9/28/72	14	F	Tackled	Victim was tackled when she was going back for a pass. When victim fell, her head struck the ground. After the fall, victim was dizzy. Game was played on lawn without protective equipment.	Concussion, head]	T & A (3 D)	
A07017*	9/17/72	12	M	Tackled	Victim was playing football in his back yard. He was the quarterback and before he could pass the ball he was tackled. The boy who tackled him fell on top of him.	Broken left collar bone	T & R	-
A03341	9/12/72	3	M	Child playing	The child was playing with the helmet in his mouth while watching television. A plastic at the center of the upper bar of the face mask stuck behind his lower front teeth. When his father removed the helmet for him, he jerked up on it, pulling victim's teeth.	Broken teeth	T & R	Football Helmet (P)
A02405*	9/11/72	13	M	Collided with other player	Victim (105 lbs.) and another boy (175 lbs.) ran into each other. They were playing back yard football.	Slight stunning, head	T & R	-
A00801*	9/7/72	11	M	Fell	Victim was playing sandlot football in school yard when he fell on his knee causing injury. Injury may have been caused by something sharp. Victim was not wearing protective equipment.	Laceration, left knee	T & R	-
A07011*	9/7/72	15	M	Attempting tackle	Victim was playing tackle football on vacant lot with friends. He was not wearing protective gear when he attempted to tackle boy carrying the ball. As victim fell, he stuck out his arm to break his fall.	Fracture, lower right arm	T & T	-

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PATTERN: Unorganized Football (Cont.)								
A28305*	8/24/72	N.S.	M	Collision	"Victim was playing football with neighborhood children. He hit his lip against neighbor child's head and cut lip. Stitches were required."	Laceration, lip	T & R	-
A06208*	8/20/72	9	M	Fell on	Victim was playing football at the local playground when he tackled a boy twice his size and the boy fell on him. Victim was not wearing protective equipment.	Fracture, lower left arm	T & R	-
A28313*	8/6/72	13	M	Lost balance	Victim was playing football in a poorly lit area. He went out for a pass and, while making a sharp turn, he lost his balance.	Fracture, right thumb	T & R	-
A04662*	2/28/73	10	M	Tackling	Victim was tackled and sprained his ankle.	Sprained ankle, right foot	T & R	Football
A03620	11/12/72	28	M	Tackling	Ball carrier was tackled and forced into another man's knees.	Fracture, 6th rib	T & R	-

*Cases originating from the National Electronic Injury Surveillance System (NEISS)

ABBREVIATIONS USED IN THIS ANALYSIS:

M - Male
F - Female
T & R - Treated and Released from emergency room
T & A - Treated and Admitted for hospitalization
(#D) - Number of days hospitalized
T & T - Treated and Transferred for hospitalization
(D) - Diagram available
(P) - Photograph available
N.S. - Not Stated

SOURCE:

In-depth investigations are conducted under the U.S. Consumer Product Safety Commission (CPSC) by headquarters and field staff and by private contractors throughout the country. Information presented in this summary pertains only to the cases cited. The data are not statistically representative of all injuries associated with this product. All in-depth investigation reports are on file in the National Injury Information Clearinghouse of the U.S. Consumer Product Safety Commission.